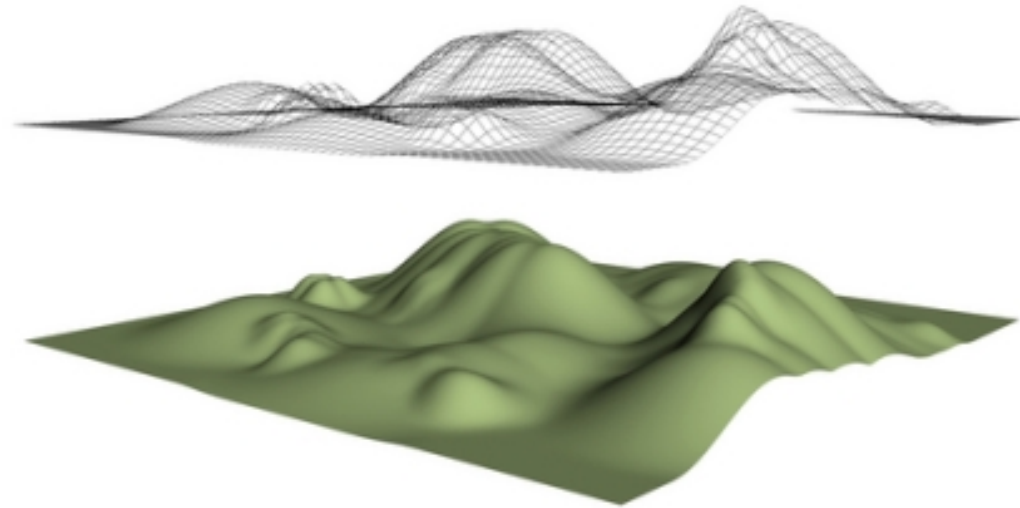


Utilizing High Resolution Topography in WRF-ARW and LAPS/STMAS with TopoGrabber

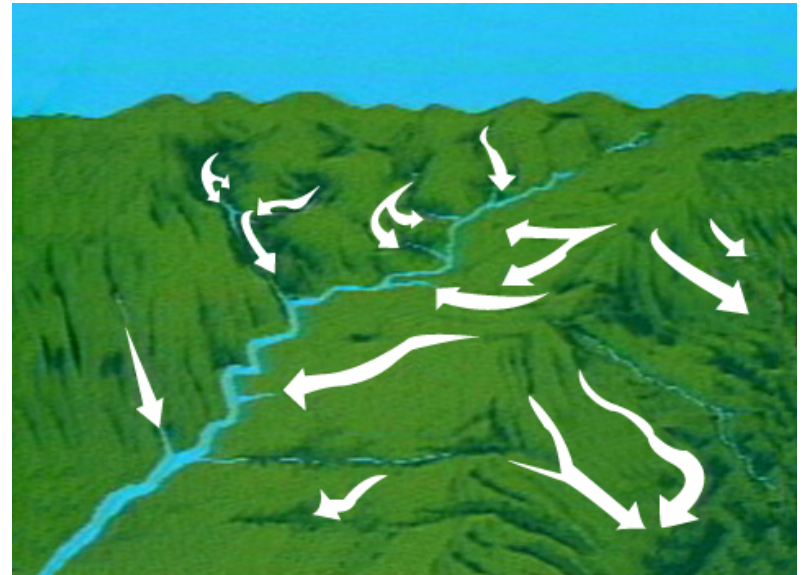


Brad Beechler

Presented to the LAPS Workshop Tuesday, October 26th, 2010

Motivation

1. Orography has a major and direct impact on the surface wind's advection.
2. Orography also affects microphysical processes such as the release of latent heat and the formation of precipitation.
3. For fire weather, regional severe storm, and accurate wind farming forecasts high resolution topography information is crucial.
4. Future modeling efforts will expect access to this improved topography and land use data.



Description of TopoGrabber

Includes: Topo_Grabber.py :A python GUI workflow wrapper.
Topo_Grab.py :A command line program that downloads domain specific geotiff data from multiple online sources.
GeoTiff2WPS.x : Converts geotiff data into raw WPS files.
GeoTiff2CDF.x : Converts geotiff data into netCDF format.*

Requires: Along with a C and Fortran compiler this package needs
NetCDF library for C
Python version 2.6 or higher
lib_tiff library (included)
lib_geotiff library (included)

Environment variables pointing to the lib_geotiff library example:
export LD_LIBRARY_PATH="/home/you/src/lib_geotiff/lib"
export LD_RUN_PATH="/home/you/src/lib_geotiff/lib"



Application to WRF

Useage:

- 1: Create a directory under your geogrid data root called topo_Is (one second topography)
- 2: Replace or link your GEOGRID.TBL (located under the /WPS/geogrid directory) with our GEOGRID.TBL.HRTOPO file. This will tell geogrid that there is now a directory under its geogrid data root called /topo_Is with your data in it.
- 3: Run the python program Topo_Grabber.py
- 4: Take the WPS raw files (eg 05001-05100.05201-05300) that were created and put them in your topo_Is directory under the geogrid data path (eg /bin/WPS/GEOG/topo_Is).
- 5: Run geogrid.exe like normal.

Topo Grabber:

TopoGrabber

Topo Data Source:

Domain:

Latitude Range (North): to

Longitude Range (East): to

GeoTIFF Output Directory:

Geogrid Output Directory: ☒ Export single tile

Output:

```
+-----+
|               ( o o )               |
|               ( _ )--Oooo.           |
|   Welcome to TopoGrabber ver 0.1!   |
|               .oooO                 |
| Wesley Smith ( ) Oooo. Brad Beechler |
|               ( )                   |
+-----+

Conversion run #1:
Using data source: ned3

Domain bounds:
  LatMax: 40.0895 N
  LatMin: 39.9395 N
  LonMax: -105.1525 E
  LonMin: -105.3025 E

Topo data output directory: boulderTIFF
Geogrid data output directory: boulderGrid

+-----+
| Downloading data from server...      |
+-----+
```

TopoGrabber: Source Editor

Name:

Server URL:

Product code:

Destination variable:

Units:

Number of categories:

Tile size:

Description:

Delete source? ☐ Yes

TopoGrabber: Domain Editor

Name:

Center Latitude:

Center Longitude:

DX:

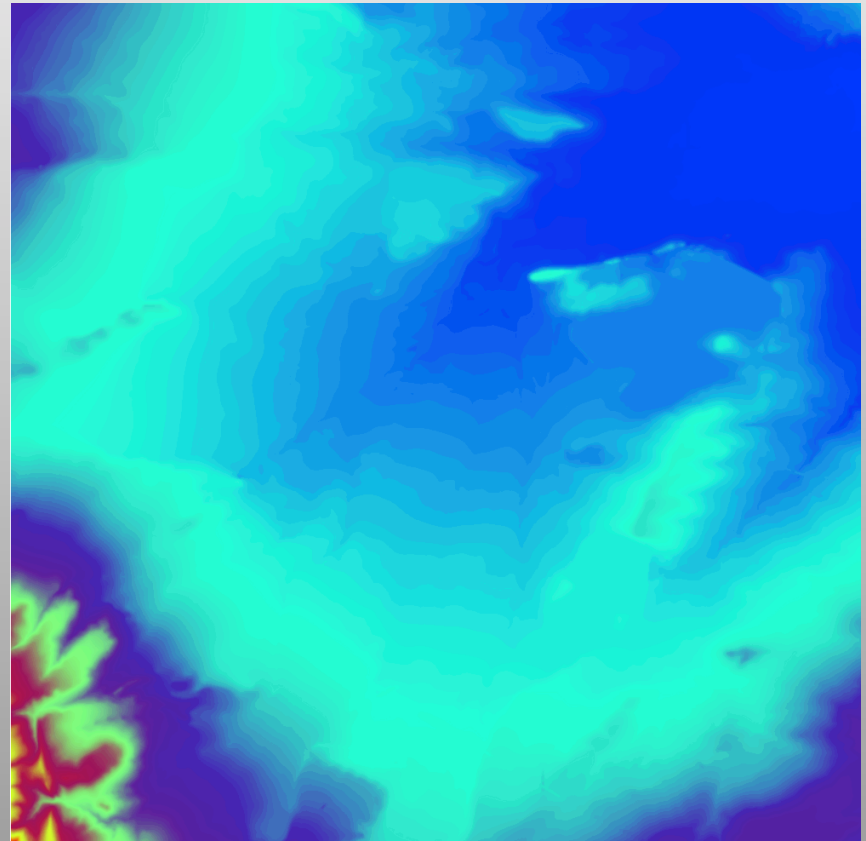
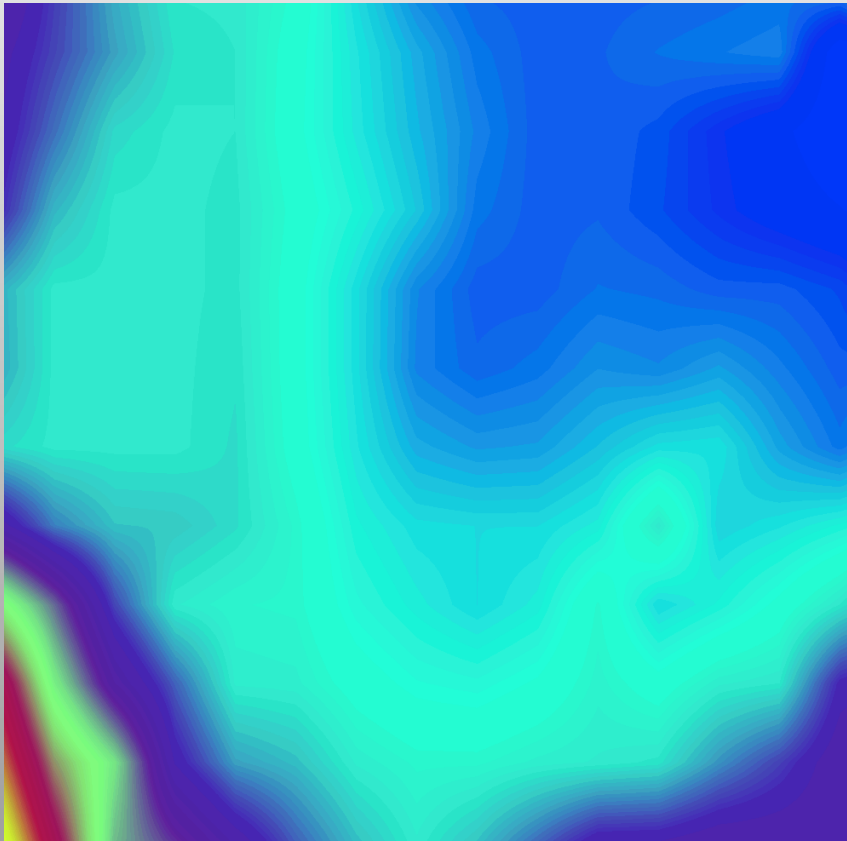
DY:

Description:

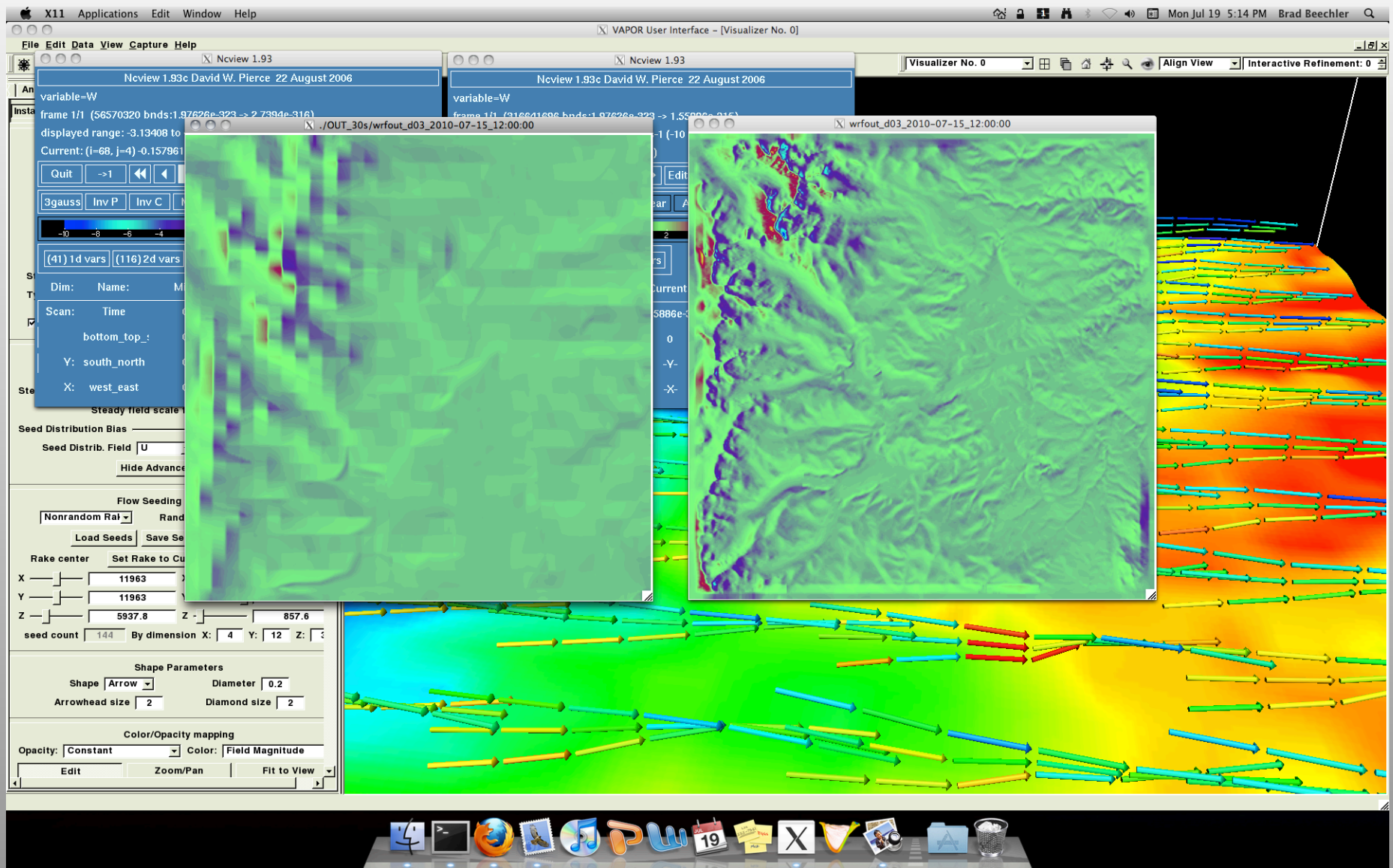
Delete domain? ☐ Yes

Boulder Topography

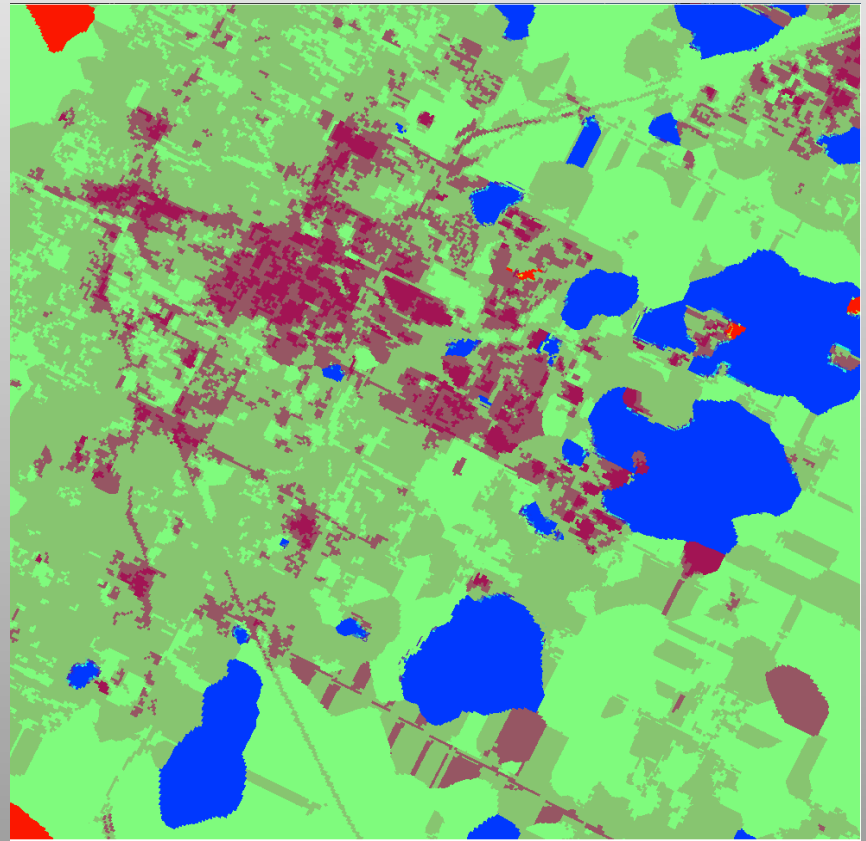
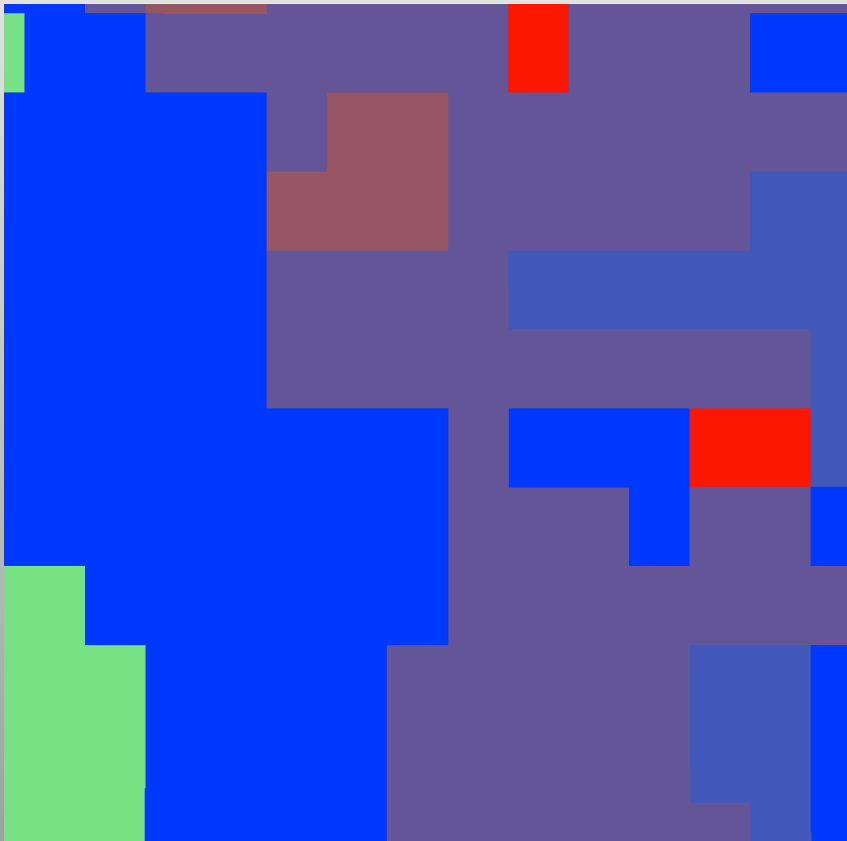
1550m – 2035m



Flatirons Topography

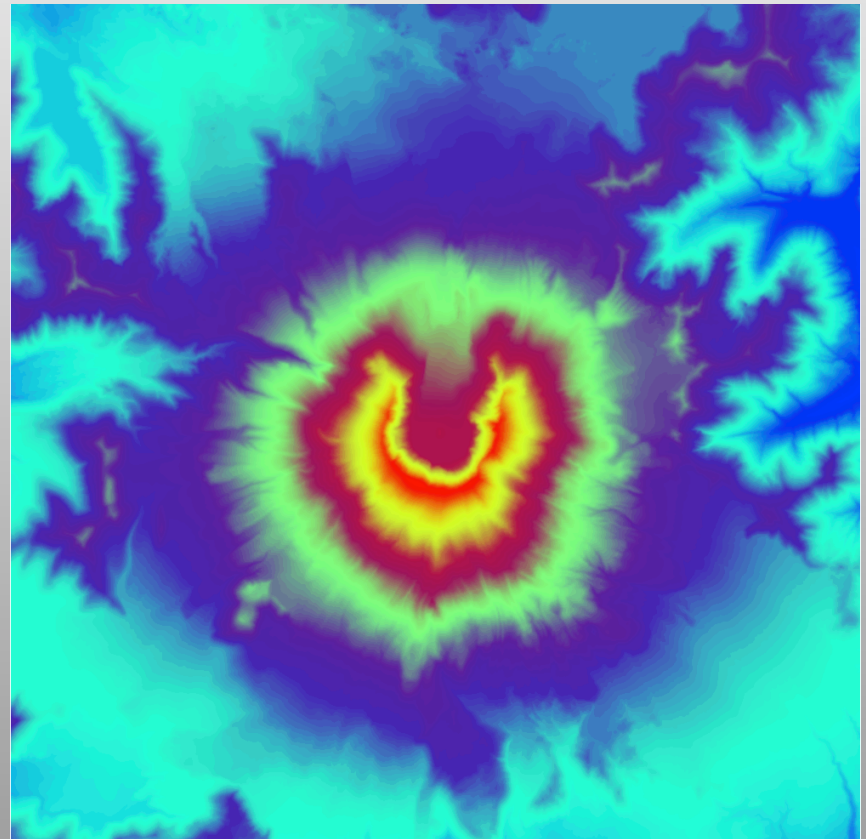
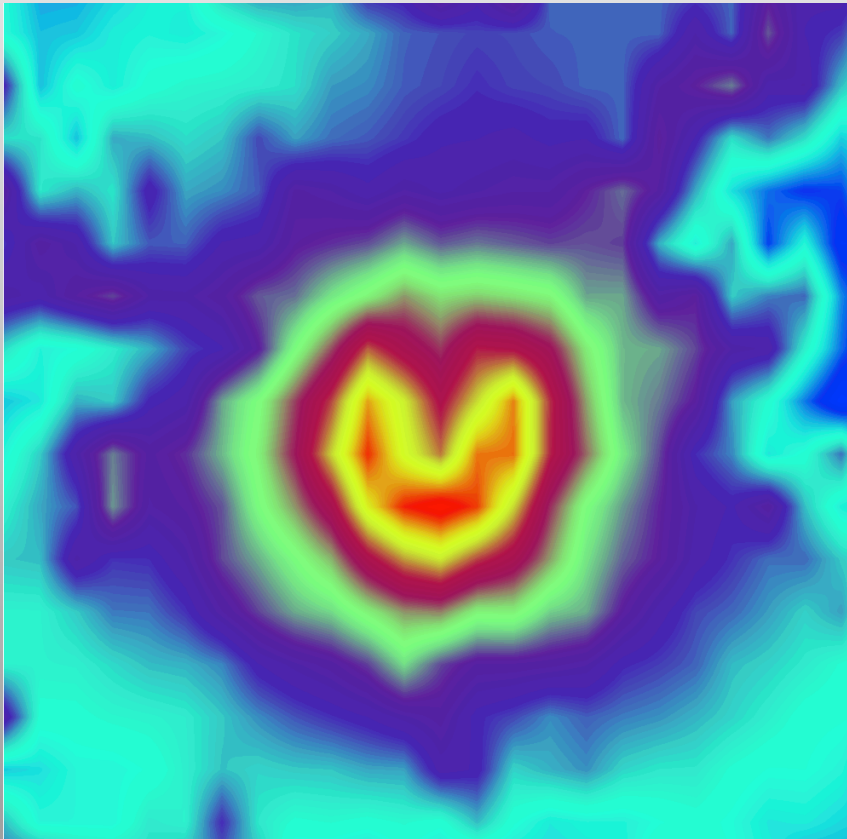


Boulder Land Use (different legends)



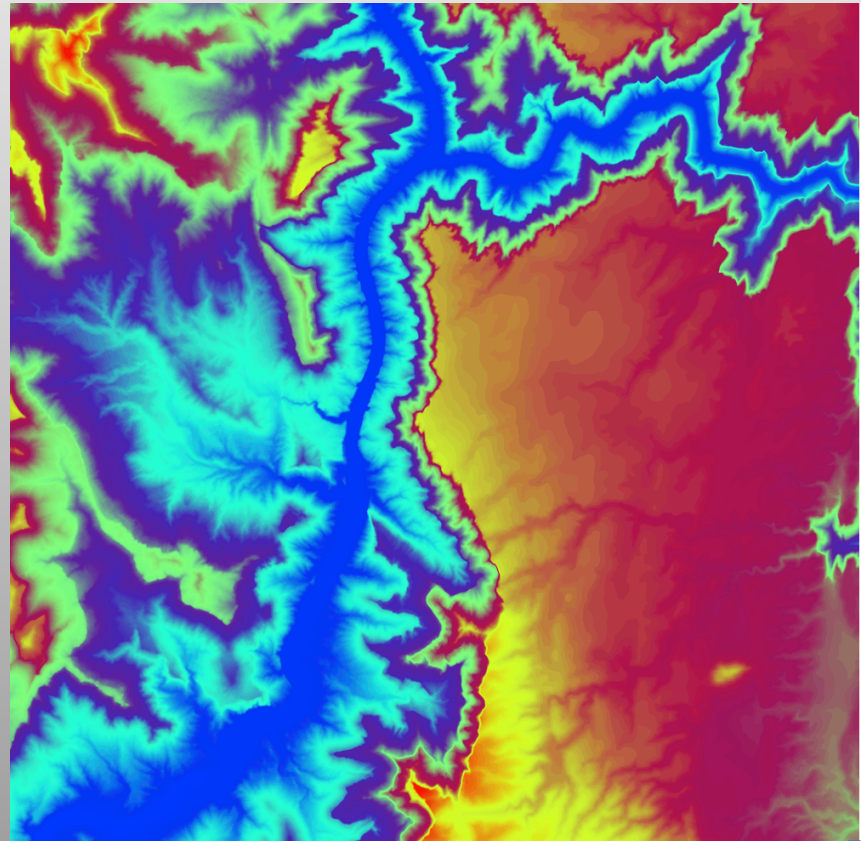
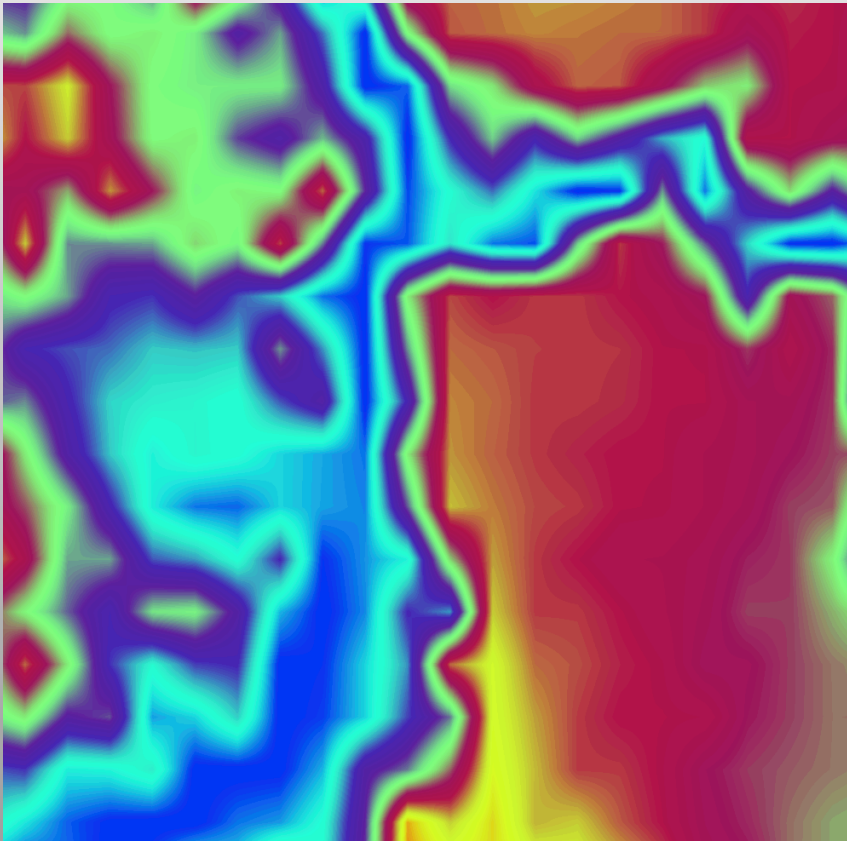
Mt. St. Helens Topography

550m – 2550m



Grand Canyon Topography

800m – 2180m





Future Work

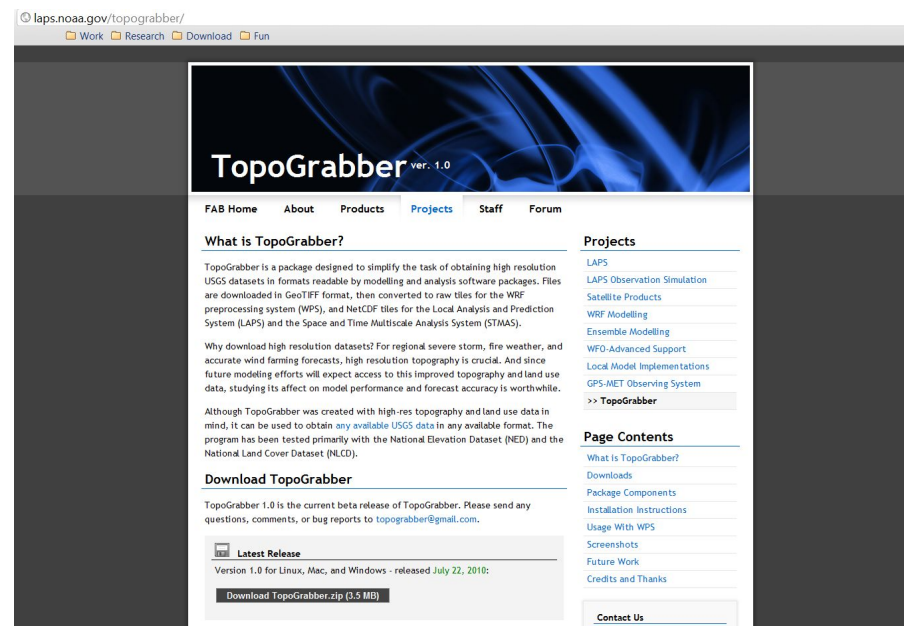
1. This 1/3 arc second (roughly 30m) data is currently being upgraded to 1/9 arc second resolution.
2. This data is only available for the continental United States, Hawaii, Alaska, and Puerto Rico. Hopefully this will be expended soon.
3. There are still major bugs in the land use ingestion function having to do with using different map geometries.
4. There are minor bugs in the code that need to be addressed dealing with usability and portability.
5. GeoTiff2CDF.x needs to be written (Ingest for LAPS/STMAS)
6. We need to beta test this process, who wants to help?

Contact Info

To get your own copy of TopoGrabber visit:

<http://laps.noaa.gov/topograbber/>

You also can find the site by typing 'topograbber' into Google.



Wesley S. Smith – wssmith@willamette.edu
Brad E. Beechler – bbeechler@precisionwind.com